



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

The formula of (*d*) is found by assuming that a parabola may be used as the interpolated curve (a parabola is determined by three points), and finding the maximum by equating the first derivative to zero. For the derivation, see Urban, *The Application of Statistical Methods to the Problems of Psychophysics*, 1908, 124f. The formula given here has A—C in the numerator and is correct. It has been misprinted A + C in *Arch.*, 16, 187, and *Psychol. Rev.*, 17, 236ff.; but with this caution in mind, see those discussions.

For examples of asymmetrical psychometric functions, see *Arch.*, 16, 199ff.

MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF CORNELL UNIVERSITY

Communicated by E. B. TITCHENER and H. P. WELD

XXXIV. SIZE *vs.* INTENSITY AS A-DETERMINANT OF ATTENTION

By J. N. CURTIS and W. S. FOSTER

This study is an attempt to compare the attention-compelling power of size and intensity in the case of Greek crosses. A standard cross, identical with that used by Meads¹, the area of which was 56 sq. cm., was compared with two similar crosses whose areas were respectively 28 and 112 sq. cm.

The apparatus used was that of Meads, save that a pendulum tachistoscope was substituted for the spring tachistoscope. The average time of exposure was also the same (110 sigma), but the mean variation of this average was reduced from 8 to 3 sigma. A 40-watt Mazda lamp was used, and the standard cross had the intensity of 225° of light.

Preliminary experiments by the method of limits indicated that results as definite and constant as those in which 'form' and intensity were compared could not be obtained for size. To rule out, so far as possible, any influence of expectation, we turned, in the regular series, to the method of constant stimulus-differences. The experiments were arranged to compensate for the irregular influences of practice and fatigue, and to measure the error of space.

The observers were Dr. E. G. Boring, Dr. W. S. Foster, and Mr. F. L. Dimmick, all highly practised. All observers completed 200 series; 50 with each of the two comparison crosses in each of the two spatial positions, right and left of the standard. The period of observation was approximately an hour in length, and in general gave time for ten series. Rest-periods of three to five minutes were allowed twice during the hour. The observer was not told the number of steps in a series, nor did he get any indication of the point at which one series ended and another began.

The instructions, which were read at the beginning of every experimental hour, were: "At 'now' put your attention definitely upon the fixation-point. Two crosses of unequal size will be exposed. Judge which of them, if either, is the more *clear*, i. e., which one of them

¹ *Am. Jour. Psych.* xxvi., 1915, 150.

catches your attention the more." The observers judged: "Right," "Left," "Equal," or "Doubtful," but doubtful judgments were rarely given, and are counted as equal. Introspective reports were not required, but were occasionally volunteered.

At the beginning of every hour a 'warming-up' series with steps of approximately 30° were taken, in which the values of the episcotister-opening for the comparison-cross were varied at haphazard over a very wide range. Such a preliminary series seemed essential, in order that the observer should receive no suggestion from the experimenter as to what region was expected to be critical. The observer knew that this series was taken for purposes of orientation, as well as for 'warming-up.' The judgments of the preliminary experiments exhibited regularity, and served as a basis for determining the range and position of the succeeding regular series. The latter could now be made out in seven to ten steps of 15° with fair assurance that their range and position were appropriately chosen. The percentages were computed separately for each group of ten series. In only 17% of the computations was the low percentage for the one end-stimulus as great as .20, and in only 11% of them is the high percentage for the other end-stimulus as low as .60. Even in these few cases, such percentages are usually inversions. We have assurance, therefore, that the range of values covered on a given experimental day is in general sufficiently great.

The position of the stimulus-series thus indicated for succeeding days, however, turned out to be much more variable than we had anticipated. In the accompanying chart the intervals of uncertainty for the various observers and for the two spatial positions are represented by heavy vertical lines. Their order from left to right is the order of practice, and their positions are evident from the ordinate-numerals which are expressed in degrees of light of the comparison-cross. Broken curves connecting the succeeding points of subjective equality are for the comparison-cross on the right; solid curves are for the comparison-cross on the left. After nearly half of the experiments had been completed, it proved that even full intensity of the comparison-cross was sometimes insufficient to make it as attractive for attention as the standard. In such cases, without knowledge on the part of the observers, the experimenter decreased the intensity of the standard, which accordingly became the variable. In the chart the values for the interval of uncertainty thus obtained are represented as if a *proportionately* increased intensity had been given to the comparison-cross, though of course such representation is not strictly justifiable.

The dots enclosed in circles represent the averages of the points of subjective equality for each observer, the two spatial positions being combined. The effect is that of combining the broken and solid curves for a given observer and a given size of cross and reducing them to a single point. The figures following the \pm sign are the mean variations of these points from the averages.

If we may trust these gross averages, it seems that the larger cross must be slightly more intense than the smaller in order to exert equal power over B's attention. Moreover, the smaller cross which is only half the area of the standard catches his attention equally well if its intensity be increased by only 8° of light; indeed, if it is placed to the left of the standard, it catches his attention at a much lower intensity.

For F, size seems in general to have very little attention-compelling power. The smaller cross must be increased by 67° to become equally

clear, but the larger cross catches his attention at an intensity no whit lower than the standard, which is only half its size. For both B and F, therefore, the standard appears to have been of a size to compel attention somewhat more easily than either a smaller or a larger size.

D requires that the smaller cross shall be much more intense, and the larger considerably less intense than the standard, if they are to catch his attention equally well.

In the case of one observer (B), spatial position makes a greater difference in attention-compelling power than a four-fold increase in area. In terms of the chart, that is to say, his two broken curves occupy more nearly the same position than do his broken and solid curves for a cross of a given area. His M. V.'s accordingly are large (110 and 102°). In the case of the smaller cross another observer (D) also has a large M. V., though in this case it is dependent not on position but upon wide daily variability, which in a lesser degree is characteristic of all observers. All of these facts, taken together, added to the facts of wide individual differences, seem to us sufficient indication that, under our conditions, *size is not a definite determinant of attention.*

We have no explanation for the apparent relative stability of the interval of uncertainty during the single experimental hour and the wide variability of its position upon different days. Since its position was roughly determined each day by preliminary experiments over a wide range of possible positions, and since within the groups of ten series there is a fair degree of regularity in the percentages, we do not think it possible that the experimenter's choice of values, and a self-imposed tendency to give approximately equal numbers of "Right" and "Left" judgments, were responsible.

Our observers, find, as a rule, that the judgment is made without difficulty. At first B was not certain that his judgments were judgments of clearness alone, and thought that the natural judgment was perhaps one of clearness and intensity combined. At first he tried actively to make the judgment solely in terms of clearness; later he takes the experiment more passively, and finds that as he does so "an intensity-clearness fusion seems to be built up. Certain intensity values force themselves in, under passive attention, as invariable concomitants of the clearness." At first he was also somewhat disturbed by the fact that at times the crosses (especially the larger one) seemed unevenly illuminated over their surfaces. After a few hours, however, he no longer mentions such difficulties, and settles down to what is apparently a constant attitude. He does not seem to realize that the smaller cross at even lesser intensities is often judged clearer than the standard. He does remark that, when the smaller cross is the clearer, it is a "bright, cute, mean little thing" and gives him the "cute little devil" attitude. He suspects that "what really happens is that, when the little one does catch attention, I'm surprised that it should in spite of being so little. I know that I'm not disposed for the little one; quite sure I do not anticipate it. The smaller cross *snaps* at me; the larger one rather *swoops* at me."

F finds no difficulty in making an immediate judgment, except when the crosses seem to be equally or nearly equally clear, and he volunteers few remarks.

D was somewhat disturbed at first by the fact that all three crosses seemed to change in size from experiment to experiment within a series, although he knew that objectively they were constant. The clearer cross often seemed to be closer to him in space, and also to come earlier in time.

Our results were obtained under special conditions and with few observers. So far as they go, however, they show that size does not possess the definite compelling power of form and intensity, and that other factors must have been at work to produce the individual differences. If this result is confirmed, the comparatively uniform influence credited to size in the case of advertisements² must be regarded as doubtful; other factors than the apparent factor of size may there have been in play.

² See e. g., H. F. Adams: *Advertising and its Mental Laws*, 1916. Cf. W. D. Scott; *Psychology of Advertising*, 1912, 157 ff; H. L. Hollingworth; *Advertising and Selling*, 1913, 67; D. Starch, *Advertising*, 1914, 61.

